**Notebook, N-95-12-04**

This undated notebook was probably used in 1895. The book consists primarily of notes by Edison regarding a series of squirted filament experiments, nos. 1-62. Preceding these notes is a list of solutions used to treat the filaments. Inserted into the book are several loose sheets containing notes by Edison to experimenter Charles Dally concerning the testing of the filaments at the General Electric lamp works in Harrison, N.J.; and logs of the tests by Charles Deshler. The pages are unnumbered, and several pages have been removed from the book. Approximately 75 pages have been used.

Base No 1 Lima strongly oxidized by Comel $H_2SO_4$ in Porcelain dish at Edison; washed a little but still acid and will not probably dry — It does not seem to become sticky by mal like the residue which has not been oxidized so much It takes a long time to filter.

Base No 2 Schuchardts Black Graphitic purified by Mal, then dried —

Base No 3 Photographers plumbago purified by Hydrofluoric + water, washed, dried & reprocessed It still full of ash —

Base No 4 Lima not oxidized so much done at Edison. It becomes sticky by mal.

Base No 5 Graphitic made by myself Nitrous fuming. flat dish keeping temp down by adding water from time to time Washed Water then Mal —

Base No 6 Dissolved Coaltar pitch in Benzol pp the Benzol in petroleum Benzine the pp filter + washed with Ether

Base No 7. Lampblack from Kerosene lamp

Base No 8 Conc'd Dipi + Sulphanilic acid.

Base No 9 The residue of coal tar pitch not dissolved in Benzol — its not lampblack as it melts some what, should be extracted still further —.

Base No 10 Hcl — with ½ as much water then aniline oil, then chlorate K, takes long time after while gets mushy and heat rises without its checked by adding water in which case there is higher oxidation and mal takes out qreat deal. If rise temp prevented its all good. This sample get slightly heated before could get water to it, filtered it and then found acid a chlorate

not all out, poured 3 gals hot $H_2O$ filtered washed Mal— didnt use much mal— as it seems to have a vast amount taken out by mal— so didnt take it all out,

No 11 Is the same as No 10 but not washed thoroughly with the hot water and not washed with Mal— dried it with water in —

No 12 Is the same as No 10 but not well washed— and afterwards washed mal—

No 13 Is highly oxd'd Lima from Edison—

Missed some Numbers—

No 20 Base 400 cc $H_2O$. 400 cc Hcl 100 cc aniline oil 50 grams $KClo_3$— worked ok Kept heat down so it didnt boil by putting in water from time to time It was at temp. I should say 150@175 fahr— Stirred it all the time it got thick — dont think there was enough $KClo_3$ — think 75 grams would be better

I filtered some water and filled 4 battery jars had them 3/4 full. poured the stiff into the four and let them soak 36 hours
Our Hcl was poor stiff full iron - we had also to filter it Even more than 400 cc $H_2O$ could be used probably 800 cc water to 400 acid + 75 grms KClO3 -
On filtering found that it was necessary to boil it several times in water + filter hot. Dried stiff not sticky in dipi hence it is a base of Lampblack order -

No 21 Base Coal tar oxidized by Nordh washed poorly with water only

No 22 Base action Nordhausen on Turpentine, washed with water + I think afterwards with Mal Sol dipi -

No 23 Base action Nordhausen on Raw Linseed oil — Sol Mal + dipi

No 24 Base Coal tar pitch dissolved in Benzol clear Benzol Solution precipitated by gasolene this is the precipitate, Melts at very high Temperature, gives shiny bottom on platina spoon residue not great -

No 25 Base Coal tar pitch dissolved in Benzol this is residue not dissolved — washed evidently by Mul — Melts + puffs considerable, melts very high temp, shiny bottom on spoon partially soluble Chloroform very sol in Dipi, Thinnes still considerable that Lumbs taken out by Bengal.

No 26 Base Syrian Asphalt acted on by Nordhausen — no heat used — filtered, dried — not sol in Dipi chloro, Mal & Anilini, funford,

No 27 Base — Anilin Roth Fuchsine Arsenic free. (Merck) Swells a little great amount white smoke comes off no ash left on spoon. Carbon difficultly Combustible, not self oxidizes — Crystalline — which pro'

No 28 Anilin Roth (Safranine) puffs a little, not crystalline, has some ash which melts + difficult soluble in hot water — Have not found solvent yet

No 29 Base Aniline Drum.
(Methyl) Arsenic free — puffs a great deal — may do as a binder.
Considerable ash but its not constitutional probably dirty utensils —

No 30 Base Aniline Drum (Brilliant)
Viscous putty melt, great amount ash but not excessive. Carbon in spoon not porous very difficult Combustible Carbon, may be due to ash or melting have no good solvent for 30

No 31 Base Aniline Violet Hoffmans
Puffs considerable, but large residue only moderate ash — apparently an impurity — Extremely difficult Combustible Charcoal — good binder and probably a base

No 32 Base. Rosaniline acetic
puffs good deal. Semi-melts large amount ash probably constitutional might answer for binder if ash not serious

No 33 Base Anilin Indulin arsenic free
puffs considerable, large residum very
dif Combustible charcoal, Considerable ash
probably only impurity yet it may
answer for binder, certainly as a binder

No 34 Base Piperinic acid — decomposes
to black substance, then melts, gets
thicker & thicker, finally Carbonizes
and puffs some, Charcoal extremely
difficult Combustible, ash & think is
an impurity as it occurs in spots
may do as a binder to run and fill up
gaps — Perhaps before mong should
be decomposed to black stuff about
1/2 of original is left as Carbon

No 35 Base Quinidine Sulphate
Melts, decomposes to red, finally to
black, towards end swells Carbon
dense & hard Combust, probably due
to melting, probably useful as a binder
when mixed with another binder
which doesnt melt, Has very little ash

No 36 Base - Is an old sample found in desk being Carbonite dissolved in Dipi & then dried —

No 37 Base Rosanilin Hydrochlorat — Nearly all residue, puffs some, scarcely any ash, Charcoal def Combust, good for binder probably base.

No 38 Syrian Asphalt dissolved in Benzol and then poured into Benzol in which large quantity Chloride Sulphur is dissolved, precipt'd by Kerosene & washed with Gasolene.

No ~~26~~ 25 — Extra - This is portion of 25 — again exhausted with Benzol, There is some soluable stuff in it sol in chloro, balance is all lampblack Very little ash —

No 40 Base

50 cc of Mercks CP Aniline oil
neutralized by CP HCl — 100 Extra HCl
added. 1000 distilled water.
40 grms KClo — 75 milgms Ammonium
Vanadate worked cold 4 or 5 hours.
I then heated it up to say 180° Fahr
when it immy changed to dark color
with some green in it & filtered red
it should be caught at time when it
still shows signs of green
filtered & boiled it in distilled water
at 180, 2 or 3 times to reduce acid
I think each time I boiled it I
added some 10 or 20 cc HCl to keep
it acid am not sure about this

No 42 Base

2000 Water 100 CP Mercks aniline
400 cc CP HCl
50 grms KClo —
got distilled water to 150 Fahr with KClo dissolved
the AnHCl was added together in beaker, before
pouring the AnHCl in water I added 200 mg of
Ammonium Vanadate to water then added AnHCl
the freeHCl was added to the AnHCl.
There was immediate action added the AnHCl
at 8.53 Kept temp 150, stirring all time poured it
into filter at 9.34 A having become semi green
on putting some on bottle disk & rubbing finger looked
brownish yellow but when dry was greenish
after filtering I squeezed cloth roughly & put
residue to soak in tall jar all night jar was 3/4
full distilled water next morning 10 am
filtered it cold squeezed again & put acid in
gal water at 150 Fahr soaked it 2 hours
then filtered it again —
Note I tried 1st filtered with more
Van + KClo but getting little yellow
stuff not wanted.
then poured 1 gal 150° water through
filter squeezed & put on platter to
dry — filter not clean — got some
filter paper moved well 3 trys

## Filiments

No.s 1, 4, 2 Regular Anilnitric Schuchardts alone with Dipi, hard very hard, got rasp like teeth on outside, very rough looking

"

Note after carbonization tested for oxidn, fil shows very course structure when oxidzd down lots of ash - probably from the technical dipi

No 3 Filment

To sulphamilic acid and dipi with No 10 mixed with it as a base, fils are somewhat tender works fairly well, would be practical if well mixed — got nearly all the fils, Dic only stuck ones, but after aquinting they are tender to handle, dont dry quick hence Curves, bends, where you left a lot up by tweezers, after they have been squeezed for a little while, change color under low power micro body of fils seems ok but surface is very bad millions of rasp like barbs on it,

No 4 filament –

Is Schwarzkopf Carbonite (No 2 Base) with dipi and No 10 as a basic, had to use a great amount of dipi, mixt was rather soft, about as soft as old Carbonite perhaps even softer, but wasnt sticky on surface, squirted fairly well, but jerky die stopped 3 times, fils under low power is good, but surface dull, & 9 notice some cracks probably from bad mixing as no 10 has a great friction, is very porous & difficult to mix, its worse than Lampblack in that respect.

Test.

| | V | Amp | Com | No on test |
|---|---|---|---|---|
| A 16 Candles | | | | |
| o.p. | 93.8 | 48.3 | 264 | 5 |
| at 2W 28.25 | 103.1 | 54.2 | 377 | 5 |

No 5 filiment

Plain No 10 with Dipi, squirts well breaks a little, perhaps because its not well mixed, after squirting ends tend curl up under Micro shows practically perfect, but surface dull, higher power shows fils perfect but surface rough, no rasp ~~[illegible]~~ Carbonized freshly squirted fils on Spoon, scarcely any swell, are still perfect under Micro of high power but show general swelling though slight all over, there are a few flaws due to bad mixing, I notice end on after above Spoon Cbgn. That outer Edge is glassy ¼ of depth probably due to solvent action dipi at high temp as it works towards surface. Apparently from this all fils having solvents ~~of~~ or Volatile matter that it will work to outer Rim and leave spongy interior produce strained Carbon It could be made harder by first making it soft by Dipi and working it, I find upon oxidizing that there is an immense amount of iron + probably some KO. in fil. this Comes from water of washing probably 7/8 is probably ash

No 5 Filament Continued

I find that the red stuff presumably iron is from the technical dipi so this dipi cant be used except it be distilled I will now use CP dipi and make a new batch,

No 5 B CP dipi - fils very rough break up in squirting get one fil at time, CP dipi dosent act like technical dipi, probably an amine in technical which dissolves No 10 fils are in the main good — I used some No 2 in the dipi to make fils smoother as previous trial with dipi alone friction too great.

No 6 Filiment

No 11 with Dipi for some reason dipi sticks it better than No 10 in fact it works OK — but while fil as a whole is good surface is very rough die is about 7/1000 squirts fairly well, but breaks very often probably friction and lumps in mixing dried 5/1000 Saphire got a foot of fil die broke surface seemed very much smoother than steel die Oxidized some of ingot found there is practically no ash except in spots, then there will be a dot of red ash showing probably dirty water On carboing platinum spoon fils contract 25% — fils extremely tough one hour after squirting can pull them through fingers End on look good on examining them still further, fils are generally perfect except the rough surface which may be an advantage its best so far — As it shrinks 25% perhaps can use less Dipi + get it harder

Note =

Tried some photographers plumbago with Nitric and dips, Equals fair-breaks in short lengths, due to specs, little rough, the terrible ash is there notwithstanding treatment with Hydrofluoric acid. Tried Electrotypers plumbago with Sulphuric acid and dips Ng - Couldnt equal, no viscosity

No 7 Filament

In Photographers plumbago, I think I used as a binder No 2 + Dipi only got a few filaments ——

No 8 Filament –

Is old Carbonite with CP Dipi worked stiff so whole powder not dissolved, squirts beautifully surface not glossy but good – fils perfect – very viscous stuff, dia dont stick once On spoon they of course swell up quick but not so bad as in old lamp experiments, think these will be good – only ¼ or so of whole is actually dissolved – After Carbonization oxidized some fils on spoon fils show minimum amount of ash fils show pure white – I remark that it is probably the lime in Technical dipi expt I state above that CP dipi used probably the Carbonite in big bottle has KCl still in it investigate as I am using this in all the Carbonite fils * Have investigated Carbonite in big bottle, considerable ash but not extra great perhaps Carbonite used 8 years from sawed off glass jar, I notice one of lamps returned from test at Lamp factory that filament is very small. * its surface is not first class, end is glassy and thin

Shrinkage good

where lamp broke shows rough structure and each of where it broke is pitty, Evidently myth which are viscous, or where powder is not fully fused lamp black will always give a spacer for unequal parts,

No 9 Filament

9 oz old carbonite dissolved in Dipi Thini liquid say then that 3 or 4 times as much No 10 put in it prepared to wight — Squirts fine fibs shrink very much in upon Carbonization

| | V | amp | Eem | Set up |
|---|---|---|---|---|
| 16 C | 104.4 | 39.2 | 292 | 5 |
| 24 c | 112.1 | 42.6 | 375 | 5 |

No 10 Filament

To No 11 Base and a little say 1/5 – @ 1/4
of No 1 Base & Dipi mixed well –
tough – squirts well 8/1000 die –
rough surface The No 1 was refiltered
after being made as originally and
ammonia put in water to neutralize
acid
Oxidation test after Carbon – oxidizes very
Lamp – infinitely more so than Lampblack
filter Late ash from Tech Dipi. S S
did I use tech dipi in this S

## No 11 filament

Same as No 10 filament but No 1 Base is dissolved completely in Dipi before mixing with No 10 Base. mixes perfect, and squirts perfect not a break, fils rough. In pan carbon cracks, Dont puff in globules but puffs slightly all over splits longitudinally I think

Oxidation after Carbon using any infinitely more in that dampt Carb falls Lots each period tectorical dipi & dull & stick dipi —

that with 3 grms No 10 500 mg No 1 dissolved in 25 drops Dipi will do better

I pugged No 11 fil hard but could be pugged harder

No 11 Carbon fil oxidizes with difficulty in open much harder to oxdz than hamp black base, but its roughness lacking when 1/2 oxdzd —

| | V | amp | cand | setup |
|---|---|---|---|---|
| 16 cp | 102.3 | .41 | 2.85 | 5 — |
| 25 — | 110.4 | .45 — | 3.75 — | 5 — |

No 12 Filiment

2500 No 20 Base
500 No 5 "
25 drops Digi CP — pugs ok squirts fine but get keep die clean, there may be two sizes fils as we changed fils die fils tough after drying think can use
250 Mid gms No 5 Base
Oxidizes with difficulty fils rough after dry
Lots ash also on Carbozn in spoon of freshly made fils shrink very much fils cracks in many places + pieces
Little ball swells, these balls may be due to bad mixing — after reg.
Carbozn no swells — even, but shrink up great, fils ok —

No 13 Filament

Electrotypers graphite + No 13 Base mixed in Dipi perfect dissolve, pumped till fairly stiff, has small viscosity though enough — Spun perfect not a break — Owing to large size of flakes it a little rough, Used 3.000 mg graphite and guessed at No 13 Base think Twas about 1500 mg + say 40 drops Dipi think could use less No 13 and pump harder — Carbonizes without burning, shining No 13 oxidizes out quickly on open Chgr

| | V | Amp | Lam | Setup |
|---|---|---|---|---|
| 16 CP | 45.3 | 1.06 | 247 | 5 |
| 31½ | 52.6 | 1.19 | 375 | 5 |

No 14 Filiment

Lampblack from Lamp 2500
No 13 Base 1000.

30 @ 40 drops Dipi - No 13 Base dissolved completely in Dipi - pings well - opaque well - rather a smooth but not shiny surface - fils A1 - good - on spoon Carbon - dont swell, good and oi - not shiny - not very oxidizable -
No 14 fil after Carbon is more uneven and I think oxidizes more readily than fil No 15 also it appears to be full of plumbago, or mixed stuff went into plumbago by heat but probably got in in die -

| | Volts | amp | Eom | Setup |
|---|---|---|---|---|
| 16c | 141 | 39.4 | 2115 | |
| 39 1/3 | 161 | .47½ | 391 | |

No 15 Filiment

Regular 5c Cornel Lampblack
2.500 mg—
1000 No 13 Base

40 Drops Dipi It was rather crumbly in pugging so I couldn't roll it in mat had about it in die in pieces squirted fairly well but broke a number of times, die stopped several times as if pieces were in it— I noticed Cornel Lampblack has gravity in it. Didnt get a good dissolve of No 13 Base in Dipi there were clots noticed when squirting fils stuck end where come out wet with black stiff therefore might be a clot of No 13 fils hang together well, quite tough under low power micro look fine but grayer than No 14 filiment. they are perfect under Micro—

| | Volts | amp | Ecm | Setup |
|---|---|---|---|---|
| 16c | 168.2 | .358 | 199 | |

## Second Lot of Filiments

No 16 Filiment

2500 mg Comed 5c Lampblack

1500 mg No 13 Base

40 drops CP Dipi – then I thought it too dry added 30 drops dipi – it got very mushy worked it down by blowing so dry that I could not make an ingot I then squeezed it in pelets by fingers so it would not hold together put several pelets in die Fils beautiful shiny somewhat squirts best when die a little hot,

After Carbon seperates good fils straight

| | Volts | Amp | Eem | Set up |
|---|---|---|---|---|
| 16c | 109.8 | 52.9 | 206 | |

Filiment No 17 –

2500 milgms Cornel 5c Lampblack
2000 mgrms No 13 Base
50 drops Dipi worked into mgt
pretty dry, but it would not squirt
took mgt out, worked it in mortar
till a powder, squeezed it in pelets
and had difficulty on account dryness
powder to get it in die, with a little
heat fils shiny & good die stops
up very often and fils as it
leaves die goes out aidemise
thinks I must have got some hard
dry pieces in it as I pugged it a
long while – The press goes very
hard with these powders yet
when a little wet it wont squirt
at all – Evidently 2500 lb + 1000
No 13 in powder could be made to work

| | Volts | amp | Econ | Setup |
|---|---|---|---|---|
| 16cp | 100.7 | .57 | 206 | 5 |
| 42 | 116.6 | 71.3 | 377 | 3 |

No 18 Filiment

2500 Comel 5c Lampblack
1.000 No 22 Base

Dipi - in which 22 dissolves perfect -
Nice fil - squirts fine but die stuck
a number times probably pieces

After Carbon - Dont stick together - Straight

| | Volts | Amp | Con | Set up |
|---|---|---|---|---|
| 16 cp | 124.6 | 51.4 | 187 | 5 |
| 49 | 148.2 | 66 ½ | 370 | 5 |

Average life 1¼ hours
all having busted;

No 19 - No 22 Base alone sticky
could handle. fits no test

No 20 Filiment

After this number including it Lampblack is washed in Ether or Gasolene to permit quartz to settle out

No 20 Fil. 2500 Camel Lampblack 5c
1000 No 5 ground fine
40 drops Dipi dissolved the No 5 in dipi completely in butter dish — poured it on lampblack so pieces would settle in bottom butter dish — Washed it blowing until it could be stirred around to a powder caked it to pelets used no heat on die, squirted perfect, didnt stop but twice for the whole. This would be perfect if they are any good think it could be washed even dryer used 5/1000 die which shows value of Ether purification and perfect dissolving of binders — fils are tender and do not have much strength but are handled easy without breaking putting them in Cuban boxes They are

OVER

Evidently porous, more so than when No 13 Binder was used,
After Carbon separate fine no sticking together, straight, tough,

| | Volts | amp | Econ | setup |
|---|---|---|---|---|
| 16 cp | 129.2 | .377 | 245 | 5 |
| 32 | 143.9 | 44.6 | 374 | 3 |

No 21 Filament

2000 Camel dampblk 5c —
2000 No 13 Base

Dipi - dissolving 13 mit — Didnt pug to powder as it would take so long its very different to do it. It squirted absolutely perfect not a break or a hitch. Fils under Micro perfect, somewhat shiny compared with No 15 fil — Another lot should be made and must pug to powder "pelets" There was used 50 dampa dipi 40 would answer

After Carbon Separates perfect, Carbons straight, no stick very strong

| | Volts | Amps | Eem | Setup |
|---|---|---|---|---|
| 16 Cp. | 106.3 | .510 | 220 | 5 |
| 38 | 121.4 | .619 | 377 | 5 |

Note,

Tried 1500 Lampblack
2000 No 13 pugged to a
very stiff mixt rough and uneven
bad agglomerates - then took out
mixt pugged to pelets, rough-
ng friction of No 13 too great

No 22 Filiment

2000 Lampblack 5c
2000 No 5 Base

50 drops Dipi No 5 dissolved in Dipi
Couldnt get to powder acts different
from No 13 — dont work out in
sheets towards then end used mgat
fairly dry but was rolled in
mgat ok, squirt good stuck
in die 2 or 3 times, there is humps
in it as it tends to dry in spots
towards end of pumping which
No 13 dont do, finishing good,
after Carbon, Separate fine all straight
good —

| | Volts | Amp | Con | setup |
|---|---|---|---|---|
| 16cp | 89.3 | 54.1 | 247 | 5 |
| 31½ | 99.1 | 62.9 | 377 | 5 |

No 23 Filament

1500 Lampblack 5c
2000 No 5 Basic,
50 drops Dipi-
Takes long time to pug - longer than
22 wat. fils not so smooth on
low power fils good - squirts OK
only stopped twice fils strong
After Carbon separate fine, straight.
difficult to oxidize in flame.

| | Volts | Amp | Eem | Setup |
|---|---|---|---|---|
| 16cp | 90.6 | 53½ | 246 | 5 |
| 31¾ | 100.6 | 623 | 379 | 5 |

No 24 Filament

2000 Lampblack 5c
2000 No 21 Base
50 drops dipi - 21 dissolved in it,
Takes a long time to pug - get wet,
squirted very rough, - pugged it
harder it squirted rougher, guess it
should not be pugged too hard
No 21 Base makes great friction
put in Carbon box there not pugged
so hard when pugged hard makes
sheet tough like leather,
(Mem - perhaps I should have used heat)

After Carbon fels little cracked
when came out not stuck but
takes little time to seperate,

| | Volts | Amps | Eem | set up |
|---|---|---|---|---|
| 16 Cp | 108.9 | 527 | 208 | 5 |
| 41½ | 125.5 | 648 | 381 | 5 |

No 25 Filament

2000 Lampblack 5c

2000 Carbonite

40 drops dipi

perfect to squirt didn't stop die a single time wyat not very hard should be tried harder 1 stroke long time to pay

After Carbon little sticky, straight,

| | Volts | amp | Cpcw | Setup |
|---|---|---|---|---|
| 16cp | 97.8 | 57.8 | 211 | 5 |
| 40½ | 111.8 | 706 | 385 | 5 |

No 26 Filament.

Same as 25 filament except only 10 drops dipi used without about 300 drops Chloroform perfect dissolves goes 4 times as quick, fil very tough good light only faint hand but more crumbly than filament 25 squirts perfect, file looks about same as No 25 fil — good surface, nothing after Carbon Dont stick straight

| | Volts | Amp | Con | Setup |
|---|---|---|---|---|
| 16 cp | 101.1 | 584 | 202 | 5 |
| 43⅓ | 116.7 | 726 | 385 | 5 |

No 27 Filament

1500 Lampblack 5c
2000 Carbonite

12 drops Dipi about 300 drops Chloroform takes longer time to pug than 25 + 26 fils. mixt not so hard squirts perfect no stops - fils good not shiny - some little wavy probably as a whole not so nice as No 26 fils tough.
After carbon seperate perfect, straight extremely shiny Oxidizes after with removal from flume.

| | Volts | Amp | Eow | Sohup |
|---|---|---|---|---|
| 16 Cp | 85. | 67½ | 208 | 5 - |
| 41½ | 97.8 | 828 | 383 | 5 - |

No 28 Filiments

1000 Lampblack 5 c.
2000 Carbonite.

12 drops dipi in about 300 drops Chloroform takes long time to peg fits rough dont squirt well, made two fingers full fits then oiled mgt & die with Machine Oil — squirted better, fits smooth, hence oil might be used when mgt is found unsquirtable, put some of these in Carbon Box —

After Carbon — Little sticking but quite a few in seperating — straight

| | Watts | amps | Eem | set up |
|---|---|---|---|---|
| 16 cp | 86.3 | 62 | 224 | |

Note –

Fused 2500 No 10
1000 Carbonite.
10 drops D-pi + 300 Chloroform
separate jerky breaks, rough surface
neg – no test –

No 29 filaments

1500 No 10 Base
2000 Carbonite.
15 Drops Dips: 300 Chloroform
Didnt get in yet very hard, as it probably wouldnt squirt, fish
Little rough not all are rough,
squirts perfect, not a break

After Carbon separates good straight

| | Volts | amp | Eow | set up |
|---|---|---|---|---|
| 16cp | 89.3 | 53½ | 250 | |

No 30 Filament

2000 No 10 Base

1500 No 13 "

35 Drops dipi no chloroform, no No 13 not sol chloro —

(Tried previously 2500 No 10 & 1000 No 13 no good, rough + crinky

plugged well & got good mat but separated rough although it didnt choke die once it was rough and uneven somewhat crinky & fibs had no strength dont think No 13 can be made to work with No 10 except in large excess of No 13 —

after Cargo sticky spots a few broken on seperating — fibs very small probably great carbonation, dark places + shiny places, tough & strong —

| | Volts | Amp | Eon | Set-up |
|---|---|---|---|---|
| 16 pp | 97.4 | 40 | 272 | 4 |
| 27 | 104.9 | 50 | 383 | |

No 31 Filament

2000 No 10 Base
1500 No 21 "

About 45 drops dipi no chloroform
it clots in dipi showing that no
part of 21 dissolves the clot
should say 1/3 dissolves 2/3 clot,
it burns ok. separate fine fib a
little brough, tough, wyat was not
very hard it could be made harder
after Curing separates good fib
a little crooked—

| | Volts | amp | Ecm | ad.p |
|---|---|---|---|---|
| 16cp | 97.4 | 45 | 272 | 4 |
| 27 | 104.9 | 50 | 385 | |

No 32 Filament –

1500 No 10

2000 No 21 –

40 drops dipi alone, took very long time pug wouldnt dry, mixt was too soft, I think no function in die was great + fils came jerky had great trouble get enough fils for test die chucked 6@8 times, fair surface some are wavy think if mixt pugged harder would be ok fils very string

After Cauber – fairly straight, little bit sticky but easily separated little puffed – very strong fil –

| | Volts | amp | Edw | Setup |
|---|---|---|---|---|
| 16cp | 93 | 431 | 299 | 5 – |
| 23 1/4 | 95.4 | 464 | 381 | |

No 33 Liniment

3,000 No 21
400 drops Chloro 10 drops dipi

No 34 = Bath formed on Carbs.
No 21 mq alone —

No 35 Filament.

6000 Plumbago Dixon Electric
2000 Carbonite —

Dips + Chloroform - spilled some of solution so probably only 1500 Carbonite, 15 drops dipt pugged it until a powder + commenced to flake and polish squirted fairly well, stiff beautiful filament like silver required heat + great pressure. Tried it again with powder not quite so dry worked about same but die stuck frequently on account of press: I having repugged it got from the press that was too dry to squirt. Think that 2000 Pbgo + 750 Carbonite could be got to work. 1500 Carbonite + 2000 Pbgo no fils fearful rough —

After Carbn no stick, straight fils brittle

| | Volts | Amp | Eon | Setup |
|---|---|---|---|---|
| 16cp | 79 | 66 | 224 | |

4 accident blow.

No 36 Filament.

2000 Dixons Electric Plumbago
750 No 13
30 drops Dipi alone

Difficult against, seems to have lumps or grit in plumbago. Film only faintly shining. Carbon in flame obscures data. Silver ele must be purified.
After Carbon - dirt stick, straight, good.

| | Volts | amp | Eem | ohm |
|---|---|---|---|---|
| 16 cp | 80.6 | 646 | 230, | |

3rd Lot of Filiments

No 37 Filiment
2000 Lampblack 5c
2000 Rosanilin Hydrochlorat
dissolved in Aldehyde with little Dipi
Little brittle works fairly well in de-
mergit — powder pelets.

No 38 filement

2000 Rosanlin Hydrochlorat
1000 No 5

Rosanlin dissolved Aldehyde No 5 in Dipi took extremely long time to pug after got mixt worked it for 1/2 hour over lamp Viscous when hot, brittle mixt when cold squirted it in hot die.
This would be good binder for dead dry powder & hot die —

Mem –

2000 Lampblack

2000 No 25 + dipi

Nearly all break in pieces coming out of die – wants more 25 I think,

See fol 54 when dipi all exhausted & stiff powdered + dried + squirted hot it worked ok, same proportions as above – in other words heat softened 25 & good binder but 25 with dipi is not

No 39 Filament

4000 No 25 and Dipi fully dissolved after got to migot took over 3/4 hour over flame to get stiff enough to squirt, die stuck a great many times, used a little heat was hard when cold but soft when warm, Towards the end it squirted better, perhaps I should not have used heat in die, fils perfect, and glossy under micro – moderately tough, Think they will fuse together on carbon. The dipi is almost impossible to evaporate out, I broke over 1/2 by allowing knife drop on them when in Carbon box – so will be short, No 25 Base puffs enormously on rapid spoon carbon – It was not originally exhausted fully by Benzol –

Mem – No 25 isn't a good binder for Lampblack with dipi cold, but by another method its OK see fil 54 —

No 40 Filament

2000 No 25

dissolved in chloroform and little dipi used – didn't dissolve well liquid murky added above to 1000 Lampblack 5° pugged quickly – mixt worked as if lumps in it. to a poor squirter. feels good under micro, not shiny

No 41 Filament

8/1000 dia 4000 Carbonite, the kind not well purified Mal. which puffs much, Chloroform and 8 drops Dipi

Dissolved This liquid poured on Carbonite in mortar, pounded very well, didn't put much in press very hard, squirted fairly well but stuck two or 3 times fits shiny - fine.

No 42 Filiment

2000 Lampblack

2000 No 33 dissolved in dipi

takes some time to get it all dissolved in

bitter dish with finger Worked whole

in mortar till it ceased to Gr. muchy,

got an ingot that was not very brittle

Squirts perfect! not a break 6/1000.

die fits good under Micro, not shiny

— Very tough —

No 43 Filiment

2000 No 20
2000 No 33 33 is dissolved in
dupi takes considerable time to dissolve by
rubbing. Took ½ hour in mortar to
gather so could be worked in finger
to an ingot. then took 20 minutes in
kneeding and sheeting to get ingot stiff
enough put it in press and it squirted
so rough was going to abandon when we
put heat on It then squirted perfect!
Surface fairly shiny. If it is good could
pug harder

Mem—

2000 Lampblack

2000 No 27 Couldnt squirt

Compress in press to hard rock like stuff

No 27 Base with very little dipi is

ok but when proper quantity used

precipitates out

No 44 Filiment

2000 Carbonite

2000 No 37

Ingot used only Aldehyde to dissolve

no dipi, couldnt squirt, put steam on die

and got a lot — in getting second lot

heat got to high and 2nd lot all fell

to pieces, probably due to Volitity of Solvent

Think these fels up—

No 45 Filiment

2000 Lampblack
2000 No 27
Instead of using all dipi used
Aldehyde and 10 drops dipi, worked
ok a semi-wgot obtained, nearly
in squirting at first broke in small
pieces put some heat on press, went
ok – press got too hot, waited till
heat somewhat outsided then fils came
out ok squirts only fair fils
smooth —

No 46 Filament

2000 No 20
2000 No 27

27 dissolved in Aldehyde with 12 drops dijai took quite a while to get ingot but we it got drier, got viscous + ok — ingot could have been made harder
Squirted perfect no heat, got off file file smooth, good, tough,

No 47. Filiments

2000 No 31
2000 Lampblack

31 dissolved in Aldehyde with 12 drops
dipi — pelets, could feel powder was
sticky squirted poor, came out in
pieces heat made it a little better
probably NG — rough surface, 9
Carbon it but have no faith in it —

No 48 Filments.

2000 No 31
2000 No 20

Aldehyde + 12 drops dipi pugs well + quickly – soon gets viscous, got in get, Could have been made harder. Squirts ok fibs have fine specs embedded in surface, otherwise ok – tough

No 49 Filiment

4000 No 29
2,000 Lampblack
found 2000 of 29 wouldnt di-
pugged quickly only pelets, not
viscous enough for ingot, wouldnt
squirt, used heat when it squirted
fine, fils tough but quite rough,
bad looking

50 Filament 2000 No 20
2000 " 29
fels rq. horrible, used heat
No test

No 51 Filament

4000 No 37. all dissolved
Aldehyde & 12 drops dipi, long time
to get it to ingot so could work it in hand
worked it sheety — Ingot could have been
made very much stiffer, would not squirt
until die heated, then squirted
perfect. beautiful glassy surface
sticks a little 8 @ 9/1000 die
should have been pugged very stiff.

No 52 Filament

2000 No 4
2000 Lampblack

No 4 dissolved in Mat and poured on Lampblack in Mortar, pugged to mix, not very viscous, very little tendency to stick to mortar – no heat, squirted fairly well fibs good but very rough surface

No 53 Filament

2000 Lampblack
2000 Carbonite, ?
dissolved in dips in excess
pugged + put out to dry, worked it to a
dry powder with big die 9/1000 +
heat got stiff fils ok but horribly
rough, squirts good, but great pressure
on press required, fils so stiff wouldn't
form circle on finger good so had bend
them on hot glass tube,

Special

No 54

2000 lampblack

2000 No 25

2 misplaced labels so 25 may be Carbonite instead of 25 but do not think so
dissolved in excess dipsi, pugged till sheety
then set it aside on butter dish to dry for one hour, powdered it until it was practically dry powder 6 @ 7/1000 di with good heat it squirted perfect comes out pretty slow, somewhat stiff, yet bend, ok on fingers, great pressure required, got over 100 fpb could have got more. This is the best lampblack fil yet obtained
has a glossy shining metallic looking surface, seems free of flaws & perfect end in looks metallic like, & not porous to same extent as other lampblack fils showing evidence of great pressure during on solid stuff & not against a springy substance think could have got powder dryer in fact believe could get it so dry dipsi & still would get the coalescing of the binder itself by heat that does it, This is a new & good departure

No 55 G

2000 Lampblack
2000 No 27

Aldehyde only - no dipi got it to a dry powder, with 6/1000 die
Crinkly - with 8/1000 die squeeks ok
breaks sometimes friction not so great as with 54 fil - not quite so good a surface also, but surface better than any previous Lampblack fil
I will called 54 standard, had bend fold over hot glass so too stiff to formloop on finger used full steam heat -

Mem = No 56 Nortest

2000 Lampblack
2000 = No 28
Aldehyde only its not a good solvent, no viscosity, dry powder
Couldn't squirt by heat as nothing softens —

No 57 Filament

2000 Lampblack
2000 Rosanilin Hydrochlorat
Aldehyde only Powder plan,
heated die — 9/1000 die squirts good, friction extremely great, fits very stiff only forms big loops over finger — but to shape on glass rod feels some good shiny others rough — tough strong fit for a lampblack one,

58 Fil – No Test

Used well purified Carbonite that didnt puff – 4000 Milgms, dissolved 1000 Thymol in Meal – powder plan, squirts fair but fils roughest ever saw – Ng

60 Fil – No Test
2000 Lampblack
2000 No 23
in Meal only no good – rough – breaks.

61 Fils – 4000 No 23 alone
no solvent used as its damp from $H_2SO_4$ aq – Ng too soft

No 59 Filament,

2000 Lampblack
2000 No 5
No 5 dissolved in about 80 drops dipi powder plan – squirts very good, fils very hard, had bend over glass think glass was too hot + may have burnt bend as I smelled ammi vapors fils some shiny + fine other rough due to friction die, Think this formula can be made to work fine by manipulation, noticed that raw fils of this Carbon put right in flame didnt self oxidize required considerable time, they stand ahead of all Lampblackers in this respect even 54 –

No 62 Filiment

2000 Lampblack
2000 Cane Sugar dissolved in mol
with 1/4 water purged to powder,
dried on radiator, squirts fair
breaks very often, but fils elegant
Try variations! had to use the
highest heat getting press very
hot, oiled the die, fils when
1st came out not very tough but
soon by absorption Agt got tough
Either wants more or less Sugar
or perhaps glucose, Caramel probably
be better, thick Caramel,
Try some Carbohydrates,

End of 3rd Batch
of filiments,

Lampfactory runs 24 hours
day or 144 hours week
continuous from Sunday
morning 7 o'clock till Monday
morning 7 o'clock —

[ITEM FOUND IN BOOK]

Dally

get the old lamps —
get the record of ~~lamp~~ the
3 orders set up 6 8 & 10
number broke on each
order, — find out how
many new orders set up
get readings on all that
have been used —
bring back broken lamps
want see them under Microscope
find how many hours a day their
lamps run on test How many
hours week they run test bank
?

SHOP MEMORANDA.
Edison General Electric Company, Lamp Works.

Wants 95 to 115 at 16 Cp —
up - 6 8 & 10 —
Other not up -

[ITEM FOUND IN BOOK]

Run 24 hrs per day, or 144 hrs per week

Do not run from Sunday morning 7 o'clock

to Monday morning 7 o'clock.

34

36 – Coronation Day

30 Spotted

32 Bearing badly

[ITEM FOUND IN BOOK]

| Order | Marked | At 16 Cp. Volts | Amps. | Energy | C.P. | Set up. Volts | Amps. | Energy | No. set up | No. broken | Avg. life | C.P. Hrs | of |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10858 | #6 | 126 | 432 | 244 | 38 | 144 | 521 | 377 | 5 | 5 | 8 hrs. | | |
| 10859 | #8 | 128.8 | 438 | 264 | 38½ | 148.3 | 516 | 375 | 5 | 4 | 49½ " | 43 | 71.1 |
| 10861 | #10 | 127.3 | 431 | 218 | 38½ | 145.7 | 521 | 377 | 4 | 4 | 8 " | | |

Rec'd Dec 2nd

| Order | Mkd. | At 16 Cp. V. | A. | Energy | CP | Setup V. | A. | Energy | No. set up | No. broken | Avg. life | 3-00 P.M. Dec. 4-95 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10874 | #4 | 128.8 | 438 | 264 | 38½ | 143.1 | 512 | 377 | 5 | 0 | 3½ hrs | |
| 10875 | #9 | 124.4 | 392 | 292 | 24 | 127.1 | 456 | 375 | 5 | 3 | 1½ " | |
| 10876 | #11 | 123.3 | 410 | 285 | 25 | 126.4 | 456 | 375 | 5 | 3 | 2 " | |
| 10877 | #13 | 125.2 | 406 | 247 | 31½ | 125.6 | 493 | " | 5 | 2 | 3 " | |
| | #14 | 140 | 394 | 275 | 39½ | 141.0 | 471½ | 391 | 4 | 2 | No light to return from test | |
| | #15 | 162.2 | 258 | 199 | | | | | 5 | " | | |
| 10878 | #16 | 129.8 | 379 | 266 | Waiting for rack room | | | | | | | |
| 10879 | #17 | 120.7 | 377 | 266 | 42 | 116.6 | 513 | 377 | 5 | 5 | 0 | 3½ |
| 10880 | #18 | 124.6 | 324 | 287 | 49 | 123.6 | 664 | 370 | 5 | 5 | 5 | 1½ |
| 10881 | #20 | 122.2 | 377 | 275 | 32 | 129 | 446 | 374 | 5 | 5 | 0 | 3½ |
| 10882 | #21 | 126.3 | 370 | 220 | 38 | 121.4 | 619 | 377 | 5 | 5 | 4 | 1½ |
| 10883 | #22 | 129.3 | 324 | 247 | 31½ | 128.1 | 639 | " | 5 | 5 | 0 | 3½ |
| 10885 | #23 | 126.6 | 332 | 246 | 31½ | 126.6 | 623 | 379 | 5 | 5 | 0 | 3½ |
| 10884 | #24 | 129.5 | 325 | 208 | 41½ | 123.3 | 648 | 381 | 5 | 5 | 0 | 3½ |
| 10891 | #25 | 131.8 | 318 | 211 | 40½ | 111.8 | 766 | 385 | 5 | 5 | 0 | 3½ |
| 10892 | #26 | 101.1 | 382 | 207 | 45½ | 116.7 | 726 | 383 | 5 | 5 | 1 | 2 |
| 10893 | #27 | 125.0 | 372 | 208 | 41½ | 118.8 | 728 | " | 5 | 5 | 0 | 3½ |
| 10894 | #28 | 126.3 | 320 | 224 | | | | | 5 | | | Waiting for rack room |
| 10895 | #29 | 129.3 | 332 | 230 | | | | | 5 | | | " |
| 10896 | #31 | 124 | 45 | 272 | 27 | 114.9 | 510 | 383 | 5 | 4 | 0 | 3½ |
| 10897 | #32 | 123 | 431 | 299 | 37½ | 124 | 441 | 381 | 5 | 5 | 0 | " |
| 10898 | #35 | 129.0 | 466 | 229 | | | | | 5 | | | Waiting for rack room |
| 10899 | #36 | 126 | 446 | 230 | | | | | 5 | | | " |

The following lamps were found broken when unwrapped.

#14 - 1
#31 - 1
#35 - 4

Schler

[ITEM FOUND IN BOOK]

L. W. 2180

| #12 | VOLTS MARKED | | AT ..... C. P. VOLTS. | AMP. | AT 16 C. P. VOLTS. | AMP. | TEST LINE NUMBER | TEST STARTED | LAMPS TAKEN DOWN |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | | 145 3/4 | .43 | | | |
| | | 2 | | | 144 | .42 1/2 | | | |
| 25/16 | | 3 | | | 146 1/2 | [illegible] | | | |
| | | 4 | | | [illegible] | .43 | | | |
| | | 5 | | | | | | | |
| up | | 6 | | | | | | | |
| Same | | 7 | | | | | | | |
| | | 8 | | | | | | | |
| | | 9 | | | | | | | |
| | | 10 | | | | | | | |
| | | AVG. | | | 147.1 | .42 1/2 | | | |
| | | CANDLES PER H. P. ..... | | | CANDLES PER H. P. ..... | | | | |

3.42

L. W. 2180

| 12/5/16 #6 | VOLTS MARKED | | AT 5 C. P. VOLTS. | AMP. | AT 16 C. P. VOLTS. | AMP. | TEST LINE NUMBER | TEST STARTED | LAMPS TAKEN DOWN |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 144 | .52 1/2 | 125 1/2 | .43 1/2 | | | |
| up | | 2 | 142 3/4 | .52 | 125 | .43 | | | |
| | | 3 | 142 | .52 1/2 | 124 1/2 | .43 1/2 | | | |
| 14/16 | | 4 | 146 | .51 1/2 | 126 | .43 | | | |
| | | 5 | 142 1/2 | .52 | 127 | .43 | | | |
| | | 6 | | | | | | | |
| | | 7 | | | | | | | |
| | | 8 | | | | | | | |
| | | 9 | | | | | | | |
| | | 10 | | | | | | | |
| | | AVG. | 142 | .521 | 126. | .43 1/2 | | | |
| | | CANDLES PER H. P. ..... | | | CANDLES PER H. P. ..... | | | | |

147 3.40

**[ITEM FOUND IN BOOK]**

L. W. 2181

| 10061 #10 | VOLTS MARKED | | AT 30 1/2 C. P. VOLTS. | AMP. | AT 16 C. P. VOLTS. | AMP. | TEST LINE NUMBER | TEST STARTED | LAMPS TAKEN DOWN |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 120 1/2 | .52 1/2 | 128 1/2 | .113 1/2 | | | |
| | | 2 | 120 1/2 | .52 | 128 1/2 | .113 | | | |
| | | 3 | 120 | .52 | 128 | .113 | | | |
| | | 4 | 120 1/2 | .52 | 128 | .113 | | | |
| | | 5 | | | | | | | |
| | | 6 | | | | | | | |
| | | 7 | | | | | | | |
| | | 8 | | | | | | | |
| | | 9 | | | | | | | |
| | | 10 | | | | | | | |
| | | AVG. | 120.1 | .521 | 127.3 | .1121 | | | |
| | | CANDLES PER H. P. | 1.98 | | 3.42 | | | | |

L. W. 2183

| 10065 #1 | VOLTS MARKED | | AT 30 1/2 C. P. VOLTS. | AMP. | AT 16 C. P. VOLTS. | AMP. | TEST LINE NUMBER | TEST STARTED | LAMPS TAKEN DOWN |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 106 | .51 1/2 | 98 | .116 | | | |
| | | 2 | 109 | .51 | 99 | .115 | | | |
| | | 3 | 108 1/2 | .52 | 98 1/2 | .116 | | | |
| | | 4 | 109 1/2 | .51 3/4 | 99 | .115 1/2 | | | |
| | | 5 | 108 1/2 | .51 1/2 | 99 1/2 | .116 | | | |
| | | 6 | | | | | | | |
| | | 7 | | | | | | | |
| | | 8 | | | | | | | |
| | | 9 | | | | | | | |
| | | 10 | | | | | | | |
| | | AVG. | 108.3 | .516 | 98.6 | .115 1/2 | | | |
| | | CANDLES PER H. P. | 1.99 | | 2.83 | | | | |

L. W. 2182

| 10862 #12 | VOLTS MARKED | | AT 29½ C. P. VOLTS. | AMP. | AT 16 C. P. VOLTS. | AMP. | TEST LINE NUMBER | TEST STARTED | LAMPS TAKEN DOWN |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 130 3/4 | .115 | 119½ | .304 | | | |
| | | 2 | 134½ | .113 | 122½ | .304½ | | | |
| | | 3 | 131½ | .112 | 119 | .304 | | | |
| | | 4 | 135 | .112 | 123 | .304 | | | |
| | | 5 | 132 | .113 | 122½ | .304 | | | |
| | | 6 | | | | | | | |
| | | 7 | | | | | | | |
| | | 8 | | | | | | | |
| | | 9 | | | | | | | |
| | | 10 | | | | | | | |
| | | AVG. | 132.6 | .113.6 | 121½ | .304 | | | |
| | | CANDLES PER H. P. | | | CANDLES PER H. P. | | | | |

17/16 OBD

1.91 2.41

L. W. 2182

| 10561 #11 | VOLTS MARKED | | AT 29½ C. P. VOLTS. | AMP. | AT 16 C. P. VOLTS. | AMP. | TEST LINE NUMBER | TEST STARTED | LAMPS TAKEN DOWN |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 137½ | .117½ | 120 | .39 | | | |
| | | 2 | 137½ | .117½ | 120 3/4 | .39 | | | |
| | | 3 | 140½ | .117½ | 120 | .39 | | | |
| | | 4 | 137½ | .117 | 120 | .39½ | | | |
| | | 5 | | | | | | | |
| | | 6 | | | | | | | |
| | | 7 | | | | | | | |
| | | 8 | | | | | | | |
| | | 9 | | | | | | | |
| | | 10 | | | | | | | |
| | | AVG. | 138.0 | .117.5 | 120.0 | .39 | | | |
| | | CANDLES PER H. P. | | | CANDLES PER H. P. | | | | |

17/16 OBD

1.91 3.00